Life Is On Schneider Electric

EcoStruxure Power Design Data Center Report

engineering ciriculum project securit

Pre-Design analyze and recommended design

by Tshingombe fiston 2026-04-16

EXECUTIVE SUMMARY

EcoStruxure Power Design - Data Center results for a Data Center made of:

- 10 IT rooms
- 360 racks per rooms
- 10 power streams
- 28 kW mechanical loads distributed on 23 feeders
- 1250.0 kVA load bank
- Using Distributed architecture

And connected to 20.0 kV medium voltage grid

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DATA CENTER DESCRIPTION

IT loads

Rack power	8.0 kW
Rack power factor	0.97
Rack power factor (leading/lagging)	Leading
Rack wiring system	4P
Rack distribution voltage level	400 V

IT Rooms rack distribution

Number of rows per IT rooms	20
Number of racks per row	18
Final distribution system	PDU

Site

Number of IT rooms	10
Number of power train sets	10
Power train redundancy type	Distributed
Total number of power train	60

Mechanical loads per power train

With mechanical loads (Yes/No)	Yes
Total nominal power per power train	28 kW
Total maximal power per power train	11 kW
Mechanical loads power factor	0.8
Power factor type (leading / lagging)	Lagging
Number of mechanical loads feeders by power train	23

Secured mechanical loads per power train

With secured mechanical loads (Yes/No)	Yes
Total nominal power per power train	21 kW
Total maximal power per power train	24 kW
Secured mechanical loads power factor	0.8
Power factor type (leading / lagging)	Lagging
Number of secured mechanical loads feeders by power train	23

Low Voltage backup generator

With backup generator (Yes/No)	Yes
Transition type	open

Low voltage main Switchboard

With UPS bus coupler (Yes/No)	Yes
With UPS load bank (Yes/No)	Yes
LV switchboard range	Okken Classic offer

Battery System

Battery type	VRLA
Runtime	12:00
State of health	Beginning of life
Battery brand	Exide
Number of racks	4

POWER TRAIN DESIGN HYPOTHESIS

MV Network

MV network voltage	20.0 kV
MV short-circuit power	500
R/X ratio	0.1

MV/LV transformer

Rating Power standard	Schneider manufacturing
Rated power	800 kVA
Transformer range	TRIHAL
Short-circuit-impedance	6 %
Nominal copper losses	8.0 kW
No load current	0.5 %
Ingress Protection (IP)	31
Winding connection	Dyn5

Transformer busway

Range	KTA
Rating	1250
Length	8 m
Busway reactance	0.448 mOhm
Busway resistance	0.121 mOhm

LV backup generator

Rated power	1260 kVA
Number of paralleled generators	1
Sub-transient direct synchronous reactance (Xd'')	15 %
Sub-transient quadrature synchronous reactance (Xq'')	29 %
Negative-sequence reactance (X2)	21 %
Zero-sequence reactance (X0)	3 %
Sustained short-circuit current (Ik3)	4.62 kA
Stator Winding Resistance (Ra)	1.26 %

Generator busway

Range	KTA
Rating	2000 A
Length	8 m
Busway reactance	0.088 mOhm
Busway resistance	0.273 mOhm

UPS input cable

Cross sections	240 mm²
Number of cable / phase	3
Length of cable	8 m
Cable reactance	0.64 mOhm
Cable resistance	0.604 mOhm
Cable type	Copper cable

UPS 1

Reference	GVX750K750NHS
Rated power	750 kVA
Losses	4.6 %
Battery charging ratio	10.0 %

UPS output cable

Cross sections	300 mm²
Number of cable / phase	2
Length of cable	8 m
Cable reactance	0.639 mOhm
Cable resistance	0.481 mOhm
Cable type	Copper cable

IT distribution PDU cable

Cross sections	95 mm²
Number of cable / phase	1
Length of cable	10 m
Cable reactance	0.82 mOhm
Cable resistance	1.931 mOhm
Cable type	Copper cable

LV/LV transformer

Rating Power standard	Other manufacturing
Rated power	160.0 kVA
Short-circuit-impedance	4 %
Nominal copper losses	2.8 kW
No load current	1.0 A
Ingress Protection (IP)	00

Rack cable

Cross sections	10 mm²
Number of cable / phase	1
Length of cable	2 m
Cable reactance	0.191 mOhm
Cable resistance	3.66 mOhm
Cable type	Copper cable

Battery System

Temperature	25°C
ECV (End cell voltage)	1.6 V

Please contact Schneider for customized solutions

POWER TRAIN COMPUTATION - Power Balance Result

		Nominal Operation Power			Maximum Operation Power		
		Active (kW)	Reactive (kVAR)	Apparent (kVA)	Active (kW)	Reactive (kVAR)	Apparent (kVA)
MV Network	**Double conversion mode**	605	72	610	701	59	703
	Double conversion mode + Battery charging	680	72	684	776	59	778
	By-pass mode	580	-15	580	670	-46	672
MV/LV Transformer	**Double conversion mode**	596	21	596	691	8	692
	Double conversion mode + Battery charging	671	21	671	766	8	767
	By-pass mode	571	-66	575	661	-97	668
Q1: Transformer circuit breaker	**Double conversion mode**	596	21	596	691	8	692
	Double conversion mode + Battery charging	671	21	671	766	8	767
	By-pass mode	571	-66	575	661	-97	668
LV Generator	**Double conversion mode**	596	21	596	691	8	692
	Double conversion mode + Battery charging	671	21	671	766	8	767
	By-pass mode	571	-66	575	661	-97	668
Q2: LV Generator circuit breaker	**Double conversion mode**	596	21	596	691	8	692
	Double conversion mode + Battery charging	671	21	671	766	8	767
	By-pass mode	571	-66	575	661	-97	668
Q4: UPS incomer circuit breaker	**Double conversion mode**	568	0	568	680	0	680
	Double conversion mode + Battery charging	643	0	643	755	0	755
UPS input cable	**Double conversion mode**	568	0	568	680	0	680
	Double conversion mode + Battery charging	643	0	643	755	0	755
UPS output cable		543	-87	550	650	-105	659
Q3: Mechanical load circuit breaker		28	21	35	11	8	13
Q15: Secured mechanical load circuit breaker		21	15	26	24	18	30
Q5: Manual by pass circuit breaker		543	-87	550	650	-105	659
Q9: Load bank circuit breaker		543	-87	550	650	-105	659
Q7: UPS bus coupler circuit breaker		543	-87	550	650	-105	659
Q8: IT load feeder circuit breaker					149	-29	152
IT distribution PDU cable					149	-29	152
Q13: PDU input circuit breaker					149	-29	152
LV/LV transformer					650	-105	659
Q10: Rack circuit breaker					8	-2	8

POWER TRAIN COMPUTATION - Short-circuit Result

Based on Standard IEC 60909

Transformer contribution	i"k3 (kA r.m.s)	ip3 (kA peak)	i"k2e (kA r.m.s)	ip2e (kA peak)	i"k1 (kA r.m.s)	ip1 (kA peak)
Q1: Transformer circuit breaker	18.3	41.3	18.6	41.9	18.5	41.6
Q3: Mechanical load circuit breaker	18.3	41.3	18.6	41.9	18.5	41.6
Q4: UPS incomer circuit breaker	18.3	41.3	18.6	41.9	18.5	41.6
UPS(1)	17.3	37.6	15.8	34.2	16.5	35.9
Q5: Manual by pass circuit breaker	18.3	41.3	18.6	41.9	18.5	41.6
Q9: Load bank circuit breaker	18.3	41.3	18.6	41.9	18.5	41.6
Q15: Secured mechanical load circuit breaker	18.3	41.3	18.6	41.9	18.5	41.6
Q7: UPS bus coupler circuit breaker	18.3	41.3	18.6	41.9	18.5	41.6
Q8: IT load feeder circuit breaker	18.3	41.3	18.6	41.9	18.5	41.6
IT distribution PDU cable	16.7	33.4	13.9	27.6	15.3	30.4
Q13: PDU input circuit breaker	16.7	33.4	13.9	27.6	15.3	30.4
LV/LV transformer	4.2	7.8	4.0	7.5	4.1	7.7
Q10: Rack circuit breaker	4.2	7.8	4.0	7.5	4.1	7.7

Generator contribution	i"k3 (kA r.m.s)	ip3 (kA peak)	i"k2e (kA r.m.s)	ip2e (kA peak)	i"k1 (kA r.m.s)	ip1 (kA peak)
Q2: LV Generator circuit breaker	13.1	32.5	26.4	65.6	14.9	37.1
Q3: Mechanical load circuit breaker	13.1	32.5	26.4	65.6	14.9	37.1
Q4: UPS incomer circuit breaker	13.1	32.5	26.4	65.6	14.9	37.1
UPS(1)	12.6	30.2	21.0	50.3	13.7	32.9
Q5: Manual by pass circuit breaker	13.1	32.5	26.4	65.6	14.9	37.1
Q9: Load bank circuit breaker	13.1	32.5	26.4	65.6	14.9	37.1
Q15: Secured mechanical load circuit breaker	13.1	32.5	26.4	65.6	14.9	37.1
Q7: UPS bus coupler circuit breaker	13.1	32.5	26.4	65.6	14.9	37.1
Q8: IT load feeder circuit breaker	13.1	32.5	26.4	65.6	14.9	37.1
IT distribution PDU cable	12.4	27.5	17.5	38.8	13.0	28.8
Q13: PDU input circuit breaker	12.4	27.5	17.5	38.8	13.0	28.8
LV/LV transformer	3.9	7.5	4.3	8.2	3.9	7.6
Q10: Rack circuit breaker	3.9	7.5	4.3	8.2	3.9	7.6

(1) Applicable for all UPSs.

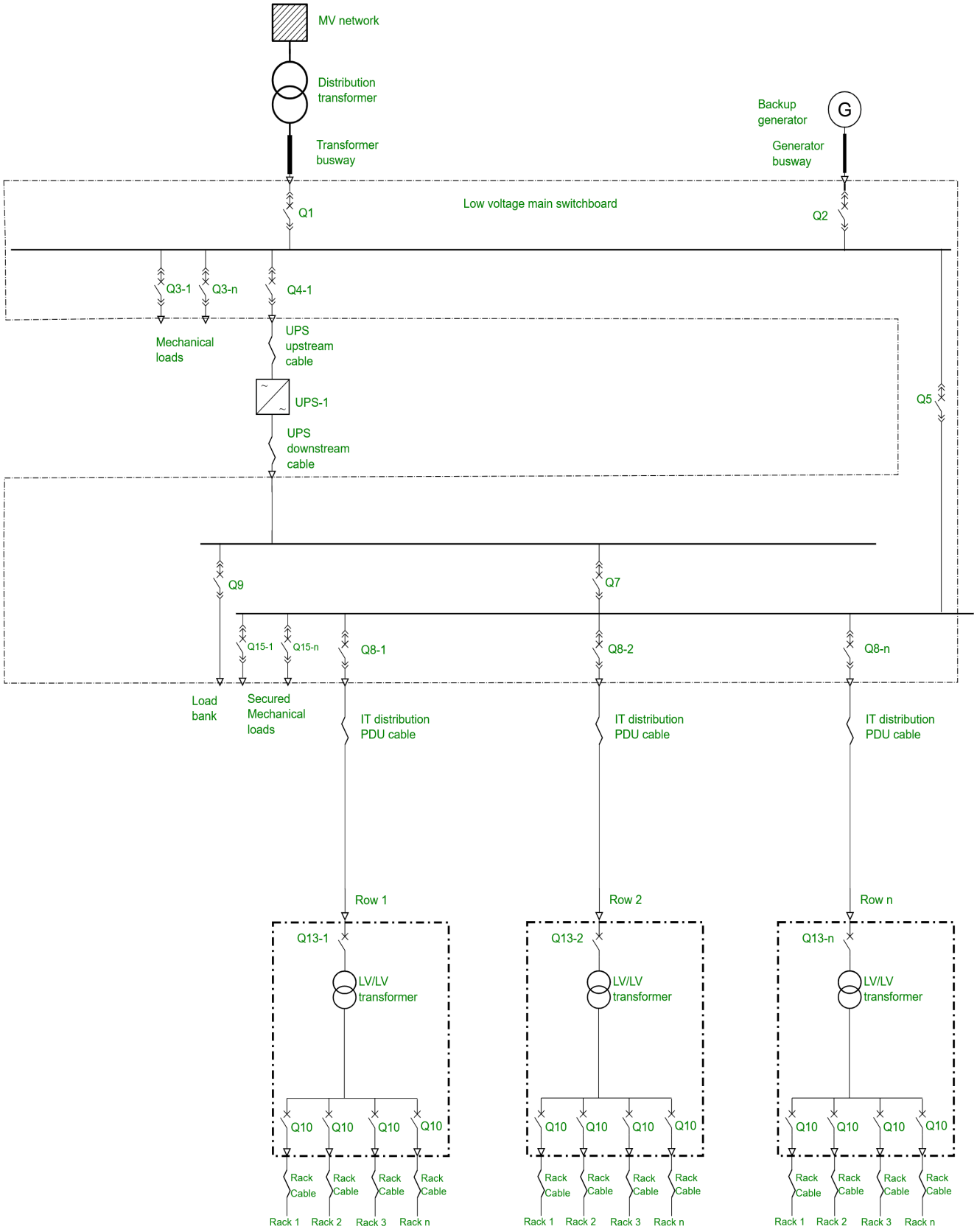
POWER TRAIN COMPUTATION - Power Usage Effectiveness (PUE)

PUE 1.24

POWER TRAIN COMPUTATION - Currents computation results

	Double conversion mode + Battery charging	
	Maximal current (A)	**Nominal current (A)**
Transformer	1107.1	969.7
Generator	998.8	861.5
Mechanical Load	0.9	2.2
UPS Input	1091.1	928.8
UPS Output	951.4	794.1
Load Bank	1082.5	1082.5
Secured Mechanical Load	1.9	1.6
Total IT Load	951.4	794.1
Row	216.4	216.4
Rack	11.9	11.9
LV/LV transformer	216.4	216.4

POWER TRAIN SINGLE-LINE-DIAGRAM



BILL OF MATERIALS

Transformers

Name	Reference	Nb	Link
Distribution transformer	TRIHAL	60	Web
LV/LV transformer		400	CONTACT US

Circuit breakers

Name	Reference	Nb	Link
Q1 – Transformer protection	MTZ1 12 H1 1250.0 A	60	Web
Q2 – Generator protection	MTZ2 20 N1 2000.0 A	60	Web
Q3 – Mechanical loads protection	NSX100B 100.0 A	1380	Web
Q4 – UPS incomer protection	MTZ1 12 H1 1250.0 A	60	Web
Q5 - Manual by pass protection	MTZ1 10 H1 1000.0 A	60	Web
Q7 – UPS bus coupler protection	MTZ1 10 H1 1000.0 A	60	Web
Q8 – IT load feeder protection	NSX250B 250.0 A	400	Web
Q9 – Load bank protection	MTZ1 12 H1 1250.0 A	60	Web
Q10 – IT racks protection	iC60 N 13.0 A	7200	CONTACT US
Q15 – Secured Mechanical load protection	NSX100B 100.0 A	1380	Web
Q13 – PDU input protection	NSX250B 250.0 A	400	Web

Busway

Name	Reference	Nb	Link
Transformer busway	KTA 1250 A	60	Web
Generator busway	KTA 2000 A	60	Web

UPS

Name	Reference	Nb	Link
UPS	GVX750K750NHS 750 kVA	60	Web

Battery System

Name	Reference	Nb	Link
Valve-regulated lead-acid Battery Cabinet	Please contact Schneider for customized solutions	Rack module number: 60 (4 levels and 4 row)	Web

Electrical Panels

Name	Reference	Nb	Link
LV switchboard	Okken Classic offer	60	Web
PDU electrical Panels		400	CONTACT US
Battery breaker panel	GV4BBK600A	60	CONTACT US

The quantities indicated in the nomenclature correspond to the entire site

LAYOUT

Distribution transformer

Dimensions:

Depth = 1170 mm

Width = 2000 mm

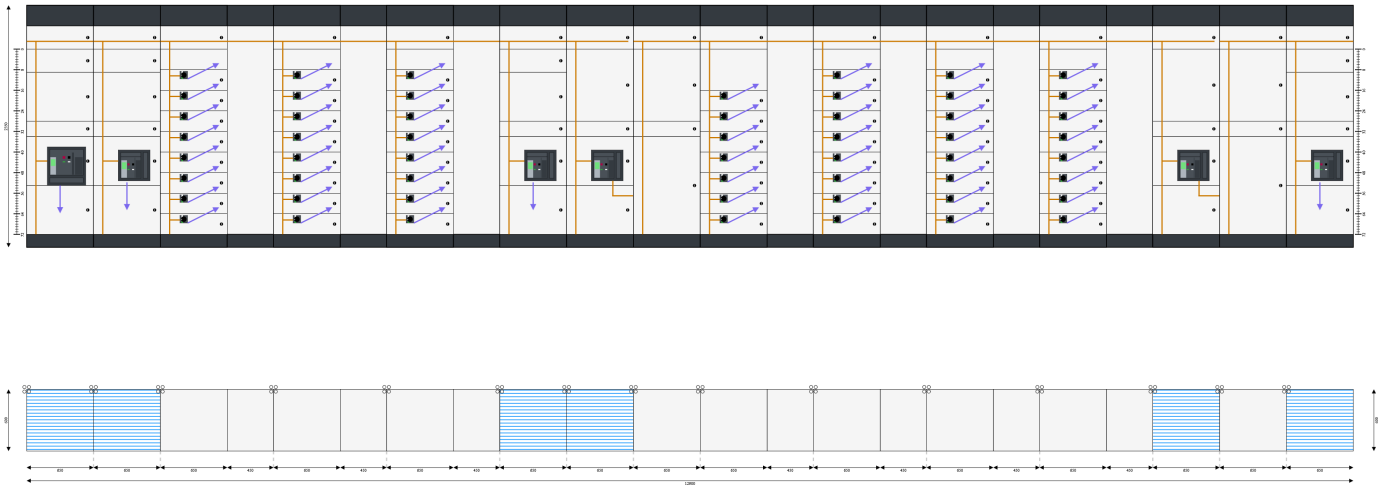
Height = 2400 mm

Minimum clearances for service are required:

• Each vertical face: 800 mm

Weight: 2795 kg

LV switchboard



Range:

Okken Classic offer

Dimensions:

Width = 12900 mm Depth = 600 mm Height = 2350 mm

Minimum clearances for service are required: • Front: 1500 mm • Above: 800 mm

UPS system

Layout of UPS unit: GVX750K750NHS

Name	Reference	Depth (D)	Width (W)	Height (H)
UPS set	1 units of GVX750K750NHS	900 mm	1 * 3000 mm	1970 mm

Minimum clearances dimensions for airflow and service access for UPS set: • Front: 1020 mm • Above: 530 mm

VRLA Battery Systems per UPS unit

Valve-regulated lead-acid Battery Systems =
1 rack module (with 4 levels and 4 rows)
of Valve-regulated lead-acid Battery

Dimensions of Battery System per UPS unit:

Depth = 930 mm

Width = 6020 mm

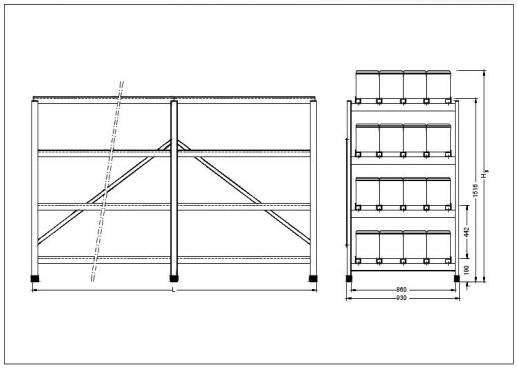
Height = 1757 mm

Weight for the battery system per UPS unit:

9272 kg

Recommended Minimum clearance dimensions
for airflow and service access for
Valve-regulated lead-acid Battery Systems per UPS unit

1 meter for 3 sides out of 4



Valve-regulated lead-acid Battery System for total UPS set

Reference	Depth (D)	Width (W)	Height (H)	Weight:
1 * 1 rack module (4 {{level}} and 4 rows per rack module)	6020 mm	1 * 1757 mm	930 mm	1 * 9272 kg

PDU

Dimensions:

Depth = 800 mm

Width = 1000 mm

Height = 2000 mm

Minimum clearances for service are required:

• Front: 1500 mm

• Rear: 800 mm

Battery Breaker Panel

Battery breaker panels per UPS unit=1

Dimensions of battery breaker panel:

Depth = 600 mm

Width = 700 mm

Height = 2100 mm

Weight: 202 kg

Engineer to order

Battery Breaker Panel for Total UPS set

Reference	Depth (D)	Width (W)	Height (H)	Weight:
1 units of GV4BBK600A	700 mm	1 * 2100 mm	600 mm	1 * 202 kg

RESOURCES

How to Optimize Electrical Distribution Design in Large Data Centers
Blog post

Complementary technical information 2021 - Selectivity, Cascading and Coordination Guide
Guide

CONTACT US

For feedback and comments about the content of this analysis

Web page: https://ecostruxure-power-design-datacenter.se.app/